B 231 NRR

B.Sc. DEGREE EXAMINATION, MAY 2019.

Third Semester

Physics

ELECTRICITY AND MAGNETISM

(From 2017-18 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

All questions carry equal marks.

1. What is a gradiant?
2. State the Gauss-divergence theorem.
3. What is electric potential?
4. What is electric flux density?
5. What is a dipole moment?
6. Define polarization.
7. What is magnetic susceptibility?
8. State the Ampere's circuital law.
9. State the lenz"s law.
10. Define mutual inductances.

PART B — (5 × 5 = 25 marks)

Answer ALL the questions.

Choosing either (a) or (b).

11. (a) Explain sclar product and vector product.

Or

(b) What is curl? Give its significance.

12. (a) Obtain an expression electric field due to an uniformly charged spherical shell.

Or

(b) Explain the relation between electric field and electric potential.

13. (a) Derive an expression for the energy of a charged conductor.

Or

(b) Calculate the capacity of a parallel plate condenser.

14. (a) Give the properties of ferromagnetic materials.

Or

(b) State the Biot-Savart's law. Explain its applications.

15. (a) Explain the faraday's law of electromagnetic induction.

Or

(b) Obtain an expression for pointing vector.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. What are the types of integrals? Explain them briefly.

17. State and prove Gauss's theorem. Find an expression for the mechanical force per unit area on the surface of a charged conductor.

18. Obtain the expression for the capacity of a cylindrical condenser.

19. Obtain the expression for the intensity of the magnetic field inside a long solenoid.

20. Describe Rayleigh's method of determining the self-inductance of a coil.

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B 231 NRR

B.Sc. DEGREE EXAMINATION, JANUARY 2022.

Third Semester

Physics

ELECTRICITY AND MAGNETISM

(From 2017-18 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Define vector integration.

2. Write down divergence theorem of vectors.

3. Define electric field and electric flux.

4. Write down expression for capacitance of a cylindrical conductor.

5. State Biot-Savart's law.

6. Define magnetic permeability and susceptibility.

7. What is a solenoid?

8. What is a Poynting vector?

9. Define self and mutual inductance.

10. Write about transverse nature of electromagnetic waves.

PART B — (5 × 5 = 25 marks)

Answer ALL the questions, choosing either (a) or (b).

11. (a) Obtain expression for curl in cartesian coordinates.

Or

(b) Discuss about line and surface integrals

12. (a) Write a note on parallel plate capacitor.

Or

(b) State and prove Gauss's theorem of electrostatics

13. (a) What are the properties of dia, para and ferro magnetic materials?

Or

(b) Discuss about Faraday's laws of electromagnetic induction

14. (a) Write a note on potential due to a charge

Or

(b) Deduce an expression for finding intensity field due to plane charged sheet

15. (a) Discuss about self inductance of a single and mutual inductance of two coils.

Or

(b) Write a note on volume integral.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Obtain expression for capacitance of an isolated spherical conductor.

17. Derive an expression for finding electric field due to uniformly charged solid sphere.

18. Deduce an expression for finding intensity of field on the axis of a solenoid carrying current.

19. Derive Maxwell's equations and discuss about their significances.

20. What are the properties of electromagnetic waves and discuss about its propagation through isotropic dielectric medium.

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B 232 NRR

B.Sc. DEGREE EXAMINATION, JANUARY 2022.

Third Semester

Physics

MODERN PHYSICS AND RELATIVITY

(From 2017-18 onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Define Photo electric effect.
2. State De-Broglie hypothesis.
3. State Bohr's quantization Rule.
4. State Heisenberg uncertainty principle.
5. Write down the energy-time uncertainty principle.
6. How the wave amplitude can be defined?
7. List the momentum operators.

8. Write the relation between probability and normalization.

9. Give the postulates of special theory of relativity.

10. Write the significance of probability current density.

SECTION B — (5 × 5 = 25 marks)

Answer ALL the questions, choosing either (a) or (b).

11. (a) Elaborate the Compton scattering.

Or

(b) Obtain the energy levels of hydrogen atom.

12. (a) Discuss the problems encountered with Rutherford model.

Or

(b) Estimate the minimum energy of a particle.

13. (a) State and prove linearity superposition principle.

Or

(b) Elucidate the physical interpolation of wave equation.

14. (a) Write a short note on stationary states.

Or

(b) Evaluate the probability current density in one dimension.

15. (a) Discuss in detail constancy of speed of light.

Or

(b) Write the significance of relativistic addition of velocities.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Illustrate Davission-Germer experiment with a neat sketch.

17. Explain in detail the working of gamma ray microscope.

18. Elaborate the method of two slit interference experiment.

19. Derive the schrodinger equation for non-relativistic particles.

20. Elaborate length contraction.

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B 231 NRR

B.Sc. DEGREE EXAMINATION,
NOVEMBER/DECEMBER 2018.

Third Semester

Physics

ELECTRICITY AND MAGNETISM

(From 2017-18 onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

All questions carry equal marks.

1. What do you mean by Laplace and differential operator?

2. What are scalar and vectors?

3. State Stoke's theorem of vectors.

4. State Gauss Theorem of electrostatics.

5. Define capacitance of a capacitor.

6. Distinguish between Curl E and Div E.

7. State Biot's and Severt's law.

8. State Ampere's circuital law.

9. What do you mean by magnetic susceptibility and permeability?

10. Write down Faraday's law of electromagnetic induction.

SECTION B — (5 × 5 = 25 marks)

Answer ALL the questions.

11. (a) Discuss about cross and dot product of two vectors.

Or

(b) If $P = XZ^2\vec{i} - 2X^2YZ\vec{j} + 2YZ^3\vec{k}$, find Curl P at point (1, –1, 1).

12. (a) Determine the capacitance of a parallel plate condenser.

Or

(b) Determine the capacitance of a cylindrical condenser.

13. (a) Deduce an expression for finding intensity of field due to a straight conductor.

Or

(b) Discuss about the properties of dia, para & ferromagnetic materials.

14. (a) Obtain an expression for the energy stored a magnetic field.

Or

(b) Write a note on Poynting vector.

15. (a) Write a note on surface integral.

Or

(b) Write a note on line integral.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss about gradient, divergence and curl their significances.

17. Derive an expression for finding electric potential and intensity due to a dipole.

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(b) Resolv
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B 232 NRR

B.Sc. DEGREE EXAMINATION,
NOVEMBER/DECEMBER 2018.

Third Semester

Physics

MODERN PHYSICS AND RELATIVITY

(From 2017-18 onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define Compton effect.

2. State Planck's quantum theory.

3. Write a note about uncertainty in momentum measurement.

4. Write down the DeBroglie wavelength of a particle having mass M and momentum P.

5. What do you mean by Eigen values and Eigen function?

6. What is energy and momentum operator?

7. Define inertial and non-inertial frame of reference.

8. What are the postulates of special theory of relativity??

9. Write about Rutherford's atom model.

10. What do you mean by duality nature?

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) What are the laws of photo electric effect?

Or

(b) Derive an expression for DeBroglie wavelength.

12. (a) Discuss about two slit interference experiment with photons.

Or

(b) Describe the experiment of position measurement.

13. (a) What are the properties of a wave function?

Or

(b) Obtain expressions for energy and momentum operators.

14. (a) Discuss about relativistic length contraction.

Or

(b) Discuss about relativistic addition of velocities.

15. (a) Write a note on Bohr's quantization and atom stability.

Or

(b) What are the problems of Rutherford atom model?

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss about energy levels of Hydrogen atom and their spectra.

17. Describe and discuss about Division and Germier experiment.

B 231 NRR

B.Sc. DEGREE EXAMINATION, MARCH/APRIL 2021.

Third Semester

Physics

ELECTRICITY AND MAGNETISM

(From 2017-18 onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. List the significance of gradient of a vector field.

2. Prove that $\nabla \cdot (\nabla \times F) = 0$.

3. State Stoke's theorem.

4. How the electric flux is defined?

5. Define magnetic susceptibility.

6. Write the divergence of magnetic field.

7. State Ampere's circuital law.

8. List the properties of ferromagnetic materials.

9. Differentiate self and mutual inductance.

10. What is meant by polarization?

SECTION B — (5 × 5 = 25 marks)

Answer ALL the questions, choosing either (a) or (b).

11. (a) Prove that curl (grad ϕ) = 0 or $\nabla \times (\nabla \phi) = 0$.

Or

(b) Describe the functions of parallel plate capacitor.

12. (a) Derive the expression for electric flux due to uniformly charged spherical shell.

Or

(b) Find the energy per unit volume in electrostatic field.

13. (a) Write a note on polarization and displacement vector.

Or

(b) Determine the curl of magnetic field.

14. (a) Write a note on magnetic properties of materials.

Or

(b) Differentiate dia, para and ferro magnetic materials.

15. (a) Derive Maxwell's equations.

Or

(b) Elaborate transverse nature of electromagnetic waves.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. State and prove Gauss's theorem and apply this to calculate the intensity near a charged cylindrical conductor.

17. Elaborate the functions of parallel plate capacitor.

18. Derive Ampere's circuital law.

19. Determine :
(a) L of a single coil
(b) M of two coils.

20. State and prove Faraday's laws of electromagnetic induction.

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